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The Artistic Element in Engineering.

AT the Buffalo meeting of the American Association for the Advancement of Science, Professor Frank O. Marvin, of the University of Kansas, and Vice-President of the Section of Mechanical Science and Engineering, read a paper on the subject which we have used as the title of this article. It might be considered impertinent for one who did not belong to the engineering fraternity to state that there is little or no attention paid by that profession in America to considerations of beauty; but this is precisely what Professor Marvin declares, and his paper is a plea for the recognition of the artistic element in engineering and mechanics. In the swift development of our country, the economic efforts of the engineer to "direct the great sources of power in nature for the use and convenience of man" have been devoted so persistently to the attainment of quick profits as to cloud that broader view which looks toward the higher and fuller life of the people. Of course, when engineering practice is based on immediate results in dollars and cents, the æsthetic element holds a secondary place, although, even from this standpoint, beauty often pays. But, after all, the engineer is primarily a designer, and if the design ignores the artistic element the thing created falls short of its highest possible good and fails to furnish that indefinable something which helps man to a richer and more refined existence. This results in manifest loss to the community, for all the useful works of the engineer may also satisfy the natural craving for beauty and there may be as much fine art in a well-planned machine for making some article of daily use as there is in a good picture or statue. There is no antagonism between what is useful and what is artistic. Good taste may be displayed in constructing a bridge or a reservoir without expending an extra dollar of money or disregarding its requirements for strength and convenience; but while American engineers are courageous and original designers, and while they have shown themselves capable of fulfilling the scientific and financial demands on their profession, Professor Marvin argues that they have paid little or no attention to artistic possibilities in their practice. For example, the American bridge satisfies the considerations of stability and least cost, but it has little of the beauty of line and balanced proportion which makes it harmonize with the landscape or makes it attractive when considered by itself. It is true that a truss with parallel chords does not lend itself readily to artistic treatment, and added ornament for its own sake is never helpful. But in the proper treatment of the organic lines, the length of spans, the relation of the length of panel to height of truss and the location of piers and their forms, very much can be done and has been accomplished in such examples as the Brooklyn and Washington bridges of this city.

Professor Marvin goes on to say that in all the intricate problems connected with municipal engineering there is an almost absolute failure to give expression to any artistic idea in public works of this sort, and although in some water-supply plants the idea of beauty has not been entirely neglected, the ugly stand-pipe with a conical cap, so often seen in smaller towns, gives evidence that the designer never had a single thought of mitigating its unsightliness, while the people whom it ought to offend daily have never uttered a word of protest, and, indeed, have never dreamed that there is another and a better way of treating such works. Professor Marvin seems hopeful that a change in public and professional sentiment will come in time, but he declares that the schools of engineering are doing little or nothing to help the student in this direction, and that so far as he knows there is but one American textbook—Professor Johnson's book on Bridges—which includes any discussion whatever of the principles of æsthetic design.

We have presented only an outline of Professor Marvin's address, but few persons will dispute his thesis that in the industrial and constructive arts we pay no heed to considerations of beauty. The eminent German who visited this country as a commissioner did not state the case too strongly, perhaps, when he reported that "in America public works are executed without reference to art." For many months the work of enlarging the approach to the New York terminus of Brooklyn Bridge has been going on and a structure has been about completed in one of the most conspicuous points of the city, and through which thousands of civilized men and women pass every day. Most surely the vestibule to such a work as the bridge ought to have some dignity of its own, or, at least, it should have some harmonious relation with the bridge. The commissioners in charge of this work are gentlemen of distinction and public spirit, and yet no one who looks at it would ever infer that they felt the slightest responsibility to satisfy man's natural longing for fitness and proportion and his natural preference for beauty over deformity. If they have any feeling for the claims of art themselves, it never has occurred to them, apparently, that the people have sensibilities which are to be respected, and this is a single example of what is almost the universal rule. This contempt for every canon of good taste begins with the very ground plan of our cities, where the rectangular street system, usually adopted, is not only inconvenient but destructive of every attempt at a comprehensive scheme of urban decoration in the way of public buildings or works of art. Monotony in the direction and width of streets becomes a weariness to the eye. There is no relief afforded by open spaces, no respect for the original contours of the land, no opportunity to give importance or impressiveness of situation to any great public building. As New York spreads northward we are losing a priceless opportunity to take advantage of the variety of surface and outlook and make the annexed district the most picturesque city in the world. We build miles of piers and wharves without considering that the treatment of the water-front is full of artistic possibilities. Our railroads gash their way across beautiful scenery, and no one so much as asks the question whether these structures could not be made so as to leave fewer scars upon the landscape. In this way we obliterate the beauty of the natural world and pile up constructions of our own which seem to rejoice in their naked and obtrusive ugliness.

Now, public officials and the executive officers of great corporations will pay heed to the claims of art in their constructions as soon as the people demand it. That no such demand is made, however, is hardly a proof that the æsthetic sense is lacking in America, for there is abundant evidence that our people appreciate good work when they see it, and our architects, painters and sculptors have proved that they have ideas and can express them. The trouble is, we have lived so long in a society which utterly ignores art in its public works that the people, as a rule, do not know that there is any other way of doing things. Nevertheless, if the looked-for improvement is to come soon, the engineer must not wait to be driven by an educated public sentiment. He is a creator. He must take the lead, and what he does must be the result of a trained taste and a thorough instruction in the principles of æsthetic design. If Professor Marvin is correct in his statement that none of our technical schools offer a training of this kind to the young engineer it is high time that this defect was remedied. An architect is considered quite uneducated if he has not been schooled in the rules of art and cannot apply these principles to his work. There is no reason why the engineer should not recognize the claims of art, should not love what is beautiful, and should not do his work artistically. He comes close to our lives in a hundred ways at home, in our business, in our pleasure. He should direct and refine public taste, and not lag behind it in this movement toward a higher level.

The second growth of timber upon stump lands is being investigated by the University of Minnesota, and the results are to be published in a bulletin. Minnesota being the last state in which White Pine is found in considerable quantities, it is the best available field for such a study, and it is well that the work is begun before it is altogether too late. It is much to be regretted that this study was not taken up by the older states and in time to make plain the utility of protecting the forests against fires from the beginning.

That American forests may be restocked as they are in Europe by logging in such a manner as to provide with certainty the necessary conditions for a second growth there can be no doubt; but how far nature can be expected to restore forest growth under the methods of lumbering now practiced, is quite another question, and its answer will be awaited with interest. This work we allude to has been placed in charge of Samuel B. Greene, Professor of Horticulture and Forestry in the University, with Mr. H. B. Ayres in the field.

Cedrus Atlantica.

A FEW months ago a view of a forest of the Mount Atlas Cedar, in Algeria, was published in this journal (vol. viii., p. 355), and our illustration on page 417 of this issue shows in greater detail the trunk of two venerable wind-swept Algerian Cedars. It is made from a photograph taken last year by our correspondent, Monsieur Maurice L. de Vilmorin, of Paris, to whose courtesy we are indebted for the privilege of reproducing it.

Early Autumn in the Pines.

THE Pines are gorgeous with color now as the leaves ripen, with no frost to mar or blacken them. The Sassafras is among the first to show the deep dyes of scarlet and crimson. Earlier in the season, while the leaves were deep green, clusters of dark blue fruit, supported by fleshy red pedicels, made it one of the most attractive trees in the woods or in the garden. It becomes a good-sized, shapely tree, and is handsome and fragrant the entire year, and it is quite free from insect depredators. The only difficulty we have to encounter in its cultivation is its liability to sucker, but with a little oversight it is easily kept under subjection. The Sumachs, of which we have several species, are all aglow, of course. Rhus copallina, the dwarf Sumach, shows bronze-purple leaves surmounted with large panicles of crimson fruit, while R. typhina, the Staghorn Sumach, has bright scarlet leaves and yellow downy stems, with crimson fruit; like the Sassafras, this plant, too, suckers badly in cultivation. The Poison Sumach, R. venenata, is handsome in the distance, with whitish fruit hanging in slender, drooping clusters beneath the rich color of its leaves.

The Sweet Gum, or Liquidambar, is resplendent with varying shades of color. Some of the trees have bronze-purple or rich chocolate-colored leaves, others take on deep crimson and scarlet hues, while still others are as yellow as the Hickories, and each tree has its individual character so far as autumn color is concerned, which it maintains year after year. The round seed-pods sway on slender pedicels from the corky-ridged branchlets, and, taken altogether, it is one of our most interesting and beautiful trees at all seasons. The Sour Gum, or Tupelo, is also a handsome tree, almost uniformly with bright scarlet or crimson leaves, and it holds its bluish, sour fruit daintily on the ends of the twigs. The Swamp Maple, with red twigs and bright crimson leaves, is a conspicuous feature in all the damp places, while the soft or White Maple is one of our least attractive trees. Its branches break easily in a strong wind and for several years past the leaves have been attacked by a fungus causing them to mature prematurely and fall early. The Oaks are still mostly a bright green color, only here and there are the leaves tipped with scarlet and crimson.

The Fringe-tree, Chionanthus, has been unusually handsome this season; all summer, beneath the large glossy leaves, the abundant fruit has hung in graceful, drooping panicles, which have looked like small green olives; until about a month past they have been deep purple, covered with a soft bloom. The Flowering Dogwood, Cornus florida, is very showy now with clusters of bright red fruit, and two species of Viburnum are scarcely less so, one with flat-topped cymes of dull red fruit, the other with abundant purple fruit. Many other shrubs and vines are full of fruit, which, with a little judicious handling, would make an autumnal garden more brilliant than the flowers of summer. The Holly, with its attractive foliage and deep red berries, remains all winter, as does the abundant scarlet fruit of Ilex verticillata and I. lævigata. The shining black fruit of the Inkberry, together with its evergreen foliage, gives it a place among the shrubs that are ornamental in winter, and the Bayberry, with gray fruit and partially persistent leaves, belongs in the same company. The Groundsel-tree, Baccharis halimifolia, is now decorated with pure white silky pappus, which remains a long time, and fairly covering it, but the contrast is almost too sharp with the brilliant color of other shrubs which surround it.

The more humble autumn flowers must not be overlooked in all this wealth of color in trees and shrubs. Great stretches of purple and gold meet the eye as it turns from the dense woods to the countless array of Golden-rod and Sunflowers, and Golden Asters (Chrysopsis Marianna and C. falcata), together with hosts of the finest species of Asters in the country. Among these are Aster Novæ-Angliæ in varying shades of deep purple to rose, the showy A. spectabilis and the stately A. puniceus. A. nemoralis and A. concolor are also handsome, and many more show occasional forms well worthy of cultivation.

But, after all, no garden looks more attractive than some of the groups here of Nature's own making, although, if we are wise observers, we may find hints for arranging forms and color so as to produce rich effects. For example, here is a dense background of Cedars along a sluggish stream with lower deciduous trees in front, the mass of foliage sloping downward gradually until it mingles with the dwarf Huckleberry and other shrubs of the Heath family only a foot or two in height. Imagine this belt of varying width, but always several rods across, and extending in a sinuous unbroken line along the water-course, and you have in autumn a picture of singular effectiveness.

Vineland, N. J. *Mary Treat.*

Changing Fashions in Flowers.

On a bright afternoon or evening, especially from December until after Easter, the florists' windows are conspicuous features of our fashionable business thoroughfares. In the daytime these are arranged with reference to the rays of the sun, and a walk on Broadway or some of the avenues on almost any Saturday afternoon is likely to show a judicious grouping of growing plants in the sunniest parts of the windows, with the flowers effectively sheltered among the luxuriant foliage. Some of the displays on ordinary days during the last year or two will be remembered by every one who saw them for their original and tasteful designs and their costly composition.

So common are these window arrangements that one hardly remembers they were not always a part of the florists' business, whereas hardly any attempt was made to gain attention by tasteful and striking arrangement even twenty-five years ago. Changes have occurred steadily in the florists' trade since 1830, when there were not more than a dozen horticultural establishments in the entire country, and marked characteristics of different periods could be cited. But, to begin twenty-five years ago, hardly one of the flowers now seen was then to be found in florists' collections. Fuchsias and tuberoses were regular stock in trade, and, their short stems pieced out with wires, served no small part in close, motley bouquets. White abutilons and double primulas were in high favor, plants of double white Primroses sometimes commanding as much as a dollar each. The once familiar Daphne odora has been displaced for more fashionable blossoms, and Bouvardias, a main reliance in all floral work, are now represented only by a few of the newer varieties in small quantities. Leaves and flowers of such commonplace plants as Tradescantia, Geraniums, Feverfew, Candytuft, Sweet Alyssum, Mignonette and Heliotrope were among those most generally used. Stevia and Eupatorium gave something like lightness to the dense and formal bouquets. Occasionally, some enterprising growers used the stately Eucharis Amazonica, and Euphorbia jacquinæflora and Chorozema varium were also sold. The dainty flowers of Lily-of-the-valley were seen during a short season only, until some twenty years ago, when the secret of hurrying the pips through an artificial winter, and so bringing them into flower the year through, was learned. The Ascension Lily, Lilium candidum, was the only Lily then forced in any quantity, while Callas were one of the most common and useful of winter flowers. Standard varieties of Carnations, now but a memory, were President de Grauw, Flatbush, Snowdon and Peerless, all white; the carmine La Purité, the yellow variegated De Fontaine and Astoria; Hinsdale, a fancy variegated, and Crimson King. Until five years before this period, the now universal practice of growing Carnations under glass in winter was unknown. The flowers were nipped off at the calyx, and those measuring an inch and a half across were considered of the first size. Importers of some of the first French Carnations seen in this country are still making the cultivation of these flowers a specialty, and to their persistent and intelligent experiments are due improvements, such as better habit of plant, firm stem, perfect calyx, clear, solid color, fragrance and keeping quality. Very few roses were sold in winter, and none of the varieties of that time are now grown for florists' use. The old apricot-yellow Safrano, the white Lamarque, with Gloire de Dijon, Maréchal Niel, Isabella Sprunt, Bon Silene and Hermosa were favorites. In Violets, Schonbrun and Neapolitan were fashionable. A larger proportion of the Dutch bulbs imported were used for forcing than now, when the most of them are planted out-of-doors. Camellias were the choicest of all flowers, and the most expensive bouquets contained only as many of these waxy flowers as the number of dollars charged for them. These formal, artificial-looking flowers are now quite out of the trade, and gardenias, still plentifully grown in England, have only a very limited call from travelers who have cultivated a liking for them there. A few chrysanthemums were sold in autumn, but they were the hardy varieties which were grown out-of-doors, and no one then dreamed that these flowers would be seen in such size and variety as now when cultivated under glass.

It must not be inferred, because a greater variety of flowers and plants are used now than a quarter of a century ago, that the business of the florist of that day was an insignificant one. Perhaps as many flowers were sold in proportion to the population then as now. In the prosperous times which followed the war, expenditures for all luxuries were lavish, and it was difficult for popular florists to secure enough flowers for the demands of their customers. A larger proportion of the flowers sold were used at funerals than now. White blossoms were universally chosen for this purpose, and not infrequently tufts of cotton tied to the regulation toothpicks were made to do duty in wreaths and crosses when enough carnations could not be had to finish the piece. This fashion of flowers at funerals at last came to be an annoyance, and on the death of a noted actor so many floral tokens of grief were sent to the bereaved family that they filled the house and flowed out over the sidewalks. Of course, such an unwise practice could not endure long in a sane community, and the excess was corrected by the notice, "no flowers," which soon began to appear in the announcements of funerals.

The change which has taken place in the material used is no greater than the revolution in the manner of arranging it. In the sixties, baskets were made solid with moss held in by a mesh of wires, into which the short-stemmed flowers were thrust. During the holidays a large basket might contain one or two heads of poinsettia, a few camellias, and perhaps some rosebuds, filled in with stevia and eupatorium, and edged with leaves of Cissus discolor or Croton. Leaves of Begonia Rex were also pressed into use for variety. In smaller baskets two or three camellias were used with the ordinary filling, and perhaps the bracts of poinsettias were placed regularly around the border. Snug hemispherical bouquets were constructed in the same motley fashion, with Geranium leaves or Sword Ferns for edging, and sometimes a stand of these compact affairs, stood in damp moss, was to be seen in florists' shops, the prices rated in proportion to size. As an example of the lavish use of flowers, it may be said that quite elaborate baskets, costing two or three dollars each, were not infrequently given as favors at private balls, three or four hundred of them being used on a single occasion.

The growing of Ferns as an article of commerce has developed entirely within the past twenty-five years, and this marks, perhaps, one of the most striking changes in the business. The table ferneries, now used so generally, were then unknown, and fronds of Ferns which are now indispensable in almost every floral arrangement, and which are considered sufficiently delicate to go with the most refined flowers, were never used. The change can hardly be appreciated by one who sees whole houses given up to the growing of Adiantums and other choice Ferns to be used exclusively for cutting. Of course, in private collections there were some choice varieties of Palms, but these plants, which are now grown by the thousand and which make the basis of display for every festal occasion, were almost unknown in the trade.

Altogether, this great change has, as a rule, been in the direction of refinement and simplicity. Instead of formal bouquets, loose, long-stemmed flowers are now used for gifts, although there seems something barbarous in the passion for mere size which is shown in giant chrysanthemums and dahlias. Nevertheless, the whole tendency is in the direction of a purer taste and a more genuine art. The formal designs are much less common, and the use of such flowers as Coreopsis, Rudbeckias, Helianthus and other native wildings is becoming general. Recalling the changes which have gone steadily on during the past quarter of a century, one wonders how the florists' shops will look in 1925.

New York. *M. B. C.*

Foreign Correspondence.

London Letter.

Acalypha Sanderiana.—This is a new species of Acalypha which Messrs. F. Sander & Co. have introduced from New Guinea and flowered recently in their nursery at St. Albans. It forms a sturdy bush, with ovate-acuminate dentate dark green leaves, from the axils of which are developed long finger-like, drooping spikes of rich crimson flowers, not unlike the flowers of Amarantus hypochondriacus (Lovelies-bleeding). It is unlike all other cultivated species of Acalypha the attractions in which are those of leaf variegation. I am told by one who has seen the plant growing in the tropics that the flower-spikes are sometimes nearly a foot long, and as they are developed profusely all down the stems, a well-grown specimen when in flower ought to be both novel and picturesque. Messrs. Sander & Co. intend to include it among their novelties next year.

Polygonum Baldschuanicum.—This is a climbing species with the habit of the common Bindweed, fleshy cordate leaves two to four inches long, and long, elegant branched panicles of white and rose-colored flowers. It is grown in the open air at Kew, where it is supported by a few pea-rods, upon which it has formed a thick tangle of stems and leaves, and it has been flowering freely for the past two months. It stood the cold of last winter without protection, but even should it prove tender it is well worth the little trouble necessary to keep it from year to year. It ripens seeds freely and may be propagated from cuttings. For its introduction we are indebted to the late Dr. Regel, who obtained it from Bokhara, in Turkestan, about twelve years ago. In general characters it resembles Boussingaultia baselloides rather than Polygonum. A figure of it will shortly be published in *The Botanical Magazine.*

Angelonia salicariæfolia.—This is a pretty summer-flowering herbaceous perennial of easy culture, and suitable either for summer bedding or for cultivation in pots in the conservatory. It forms a compact little bush about a foot high, with opposite ovate-lanceolate toothed leaves about three inches long and terminal erect racemes six inches long, clothed with bract-like leaves and stalked bilabiate flowers an inch across, colored purple-blue, with a few reddish spots in the throat. It is easily propagated from cuttings, and nice plants can be grown in six months on a shelf in a warm greenhouse. This year some plants have been tried in the open air at Kew and have proved quite a success. I am told that in some parts of India this species is popular as a bedding plant. It is a native of Guiana, whence it was introduced into England about seventy years ago. Angelonia is closely related to Alonsoa.

Salvias.—The following half-dozen species are valuable bedding plants for autumn effect. They are propagated from cuttings struck in heat in early spring and grown on until June, when they are planted in large beds on a lawn in a sunny position, where they grow into bushes three or four feet high and develop their flowers in September. A few years ago all the species of Salvia obtainable were grown at Kew, and from them these six species were selected as being most suitable for ornamental gardening: S. splendens forms a dense leafy bush and bears erect terminal racemes of bright scarlet flowers; also a most useful plant when grown in pots with Chrysanthemums and brought into flower in a sunny greenhouse in October. S. involucrata (Bethellii), a very sturdy grower, with dark green leaves, the midrib and petiole colored red, and the erect racemes six inches long, crowded with large flowers of a rose-red color. The buds are enclosed in large bracts, forming a conical-like head, hence the name; also a good winter-flowering plant for pot-cultivation. S. azurea (Pitcheri) forms an elegant shrub four feet high, with linear leaves and long terminal spikes of azure-blue flowers. S. patens, a well-known garden plant, though not much grown nowadays; its stems are very soft, about two feet high, and the elegant spikes continue in flower for months, the large gentian-blue flowers being most attractive. A mass of this species in a good position on a lawn is one of the most effective beds in the garden. S. coccinea is a sturdy grower, four feet high, with hastate, rich green foliage and erect spikes a foot long bearing whorls of bright scarlet flowers. S. Grahami forms a thick bush two feet high, with soft, green, apple-scented, ovate leaves and short racemes of rich carmine-red flowers. These six species grown together in a large bed produce a rich effect which continues till the frost ends them.

Sternbergia lutea.—I ought certainly to have included this in my notes on autumn-flowering bulbous plants (see page 374). It is now flowering freely in several borders here, and the rich canary-yellow of its large Crocus-like flowers is most pleasing. Although an old garden plant and quite hardy, at any rate in the warmer parts of England, it is rarely seen, and, even where grown, a small patch of it in the rock-garden is considered sufficient. In my opinion it is one of the prettiest and most useful of all autumn-flowering hardy bulbous plants, and if not already popular with you it deserves to be. The bulbs, which should be planted six inches deep, are like those of the Daffodil; the shining green, strap-shaped leaves are developed along with the flowers, and the flowers are erect, four inches high, the upper portion being divided into six ovate concave segments, forming a cup two inches across. The plant is common in the Mediterranean region. Sternbergia macrantha is as large again in flower and appears to be quite as hardy. It is still rare in gardens.

Crocus speciosus is the largest and most attractive of all the autumn-flowering species; it is also easily established in sunny grass-clothed banks, and, unlike many bulbs recommended for such positions, it comes up year after year with increased vigor. Quantities have thus been established in the wild garden and similar positions at Kew, where for the past fortnight they have made a fine display of bright purple. Bulb growers among the nurserymen here are alive to the value of this plant, and some of them now possess large stocks of it. Another species of almost equal value as an autumn-flowering bulb of easy culture is C. zonatus, which has pale purple flowers as large as those of C. speciosus. These two species are natives of Asia Minor, where they are met with in some localities in enormous quantities. Bulb growers ought to endeavor to induce these two to throw color varieties by means of cultivation and selection from seeds.

Sunflowers and Michaelmas Daisies in the Arboretum add a rich note of color in the autumn when planted in large breadths in positions where they will tell. At Kew large masses of them are grouped among the Pines, Cedars, etc., in and about the margins of plantations, and they now give life and color just where it was most needed. The perennial Helianthuses, such as H. maximus and H. rigidus, and any of the autumn-flowering Asters are quite at home in such positions. They are not planted in formal beds but in irregular groups, the ground being first broken up and manured in spring and the plants put in somewhat thickly. After this they practically take care of themselves. Anemone Japonica is also most appropriate for uses of this kind, as also are the Solidagos. Roses and Pæonies serve a similar purpose for spring effects.

London. *W. Watson.*

The first frosts which bring death to much tender herbage introduce no discord into the natural landscape. There is never a greater expression of unity in nature than there is at this restful season of the year when every shrub and tree is waiting for the fall of the leaf and the silence and sepulture of winter. It is not so with most garden landscapes, for where the plants are killed outright they leave such a blackness and such a picture of death that all unity is destroyed. Last spring some Cannas were introduced in a park among some shrubs with exuberant, almost tropical foliage, to bring in a dash of color and differences of form, but the first frost blackened the Cannas and ruined the effect of the group for a full month. It is a mistake to use tender plants for massing with hardy ones. Our autumns are long and we cannot afford to have their beauty marred by any such violation of the spirit of restfulness and peace which pervades its landscapes.—*Bailey.*

New or Little-known Plants.

Berberis Nevinii.

OUR figure of this shrub, which is presented below, will, perhaps, serve to call attention to an exceedingly rare and little-known plant of which the fruit has not been collected, and which may be expected to be a most desirable inhabitant of the gardens of temperate countries. Berberis Nevinii* belongs to the section Mahonia of the genus, and is described by Mr. Nevin, who discovered it several years ago on a sandy plain near Los Angeles, California, as a shrub seven or eight feet tall. The leaves are composed of from three to seven oblong-lanceolate, spinulose-serrate, obscurely reticulated leaflets, often nearly an inch long, and are rather shorter than the loose racemes of yellow flowers. Information with regard to this very handsome and distinct plant and a supply of ripe fruit are especially desired by the director of the Arnold Arboretum.

Fig. 54.—Berberis Nevinii.

Plant Notes.

Baccharis halimifolia.—A large vase filled with flowering sprays of the Groundsel-tree, Baccharis halimifolia, was an interesting feature at the American Institute flower show last week. On the New Jersey seacoast this shrub becomes a real tree, ten or fifteen feet high, and with a trunk three or four inches through, being the only member of the great family of Compositæ which attains to this distinction in our flora. The flower-heads are not large or showy, for they have not the conspicuous ray florets which distinguish our Asters, Sunflowers and other members of the family, but they are very abundant, and since they appear in early October, when no other shrub is in bloom, B. halimifolia has distinct merits as a flowering plant. This is especially true of the pistillate plants, for the fertile and sterile flowers are borne on separate individuals. The fertile flowers are much the more showy with their white tufts of long thread-like corollas, and as late as December the plants are covered with a gray pappus which is quite as showy as the flowers. The Groundsel-tree takes well to cultivation, and with attention it becomes a better plant than it is in the wild state. In good soil it becomes a compact bush or low tree, and its green leaves persist until winter fairly begins.

* Robinson, *Syn. Fl. N. Am.*, I., pt. I., 69 (1895).

Iris Japonica.—This plant, generally known as Iris Sinensis or I. fimbriata, is an Asiatic species which has been in cultivation many years in greenhouses. It may possibly be hardy, but as it flowers in the late autumn and winter it should be grown under protection and where slight heat may be given when it flowers. This is a crested Iris, and is classed in the same subgenus, Evansia, as our native species, I. lacustris and I. cristata. It has thin, sword-shaped leaves, one foot or more long, an inch broad and somewhat lax. Strong plants produce stems furnished with many flowers, which make a true raceme. The flowers appear in succession, and are some three or more inches in diameter. In color they are a beautiful delicate mauve, very similar in tone to those of I. cristata. They have a distinct crest and yellow markings at the throat, and the falls are finely crisped. It is altogether a charming plant and worthy of a place in the choicest private collections. It does not seem to be always successfully grown, but Mr. Gerard has recently sent to this office some perfect flowers. His method of culture is simple. It is repotted after flowering in good sound loam, rather light, but rich, and well supplied with water as it makes growth. He gives it moderate shade, as its habit seems to indicate.

Cultural Department.

Notes on New Roses.

NO Rose in recent years has been so widely advertised and and so highly praised as the Crimson Rambler. It has been offered for sale in every hamlet in this part of Massachusetts by the agent of some nursery firm, and every cottager has had the chance to plant the new favorite in his garden. Owing to skillful advertising and brilliant pictures it has had an unusual sale. Many who purchased it were led to believe that it would produce bouquets of a hundred or more blossoms to a shoot the first season, and they were naturally disappointed when it did not bear a solitary flower. Crimson Rambler is certainly a valuable introduction, but, like all new plants of merit, it has been too highly lauded. With us it has proved perfectly hardy, and a temperature of ten degrees below zero did not kill it back in the least last winter. Plants set out last year bloomed satisfactorily in June and have made excellent growth during the present season. Young plants set out in three-inch pots at the end of May now have stout shoots from three to five feet in length and ought to do well next year. Last July I saw a splendid stock of this Rose at the nurseries of the introducer, Mr. Charles Turner, of Slough, England. Two hedges of it five feet in height and of proportionate thickness were a magnificent sight. I counted shoots carrying from one hundred and fifty to two hundred and fifty flowers each, and this was in a dry season. Some growers in England have found it makes an excellent climber. At a large private place in one of the northern counties a wall twelve feet in height was for some distance covered with it and it was blooming profusely. It makes a good companion for such old favorites as William Allen Richardson, Gloire de Dijon, Reine Marie Henriette, Devoniensis, Maréchal Niel and Lamarque. The capabilities of this Rose as a pot plant were well demonstrated by the superb specimens shown by Mr. Jackson Dawson, of the Arnold Arboretum, at the spring show of the Massachusetts Horticultural Society last March. One or two florists of my acquaintance have grown batches in pots and will endeavor to have them in flower for next Easter. Nicely flowered plants ought to be in demand for that season.

Lord Penzance's hybrid Sweetbriers have had a large sale, both in America and Great Britain. They are apparently even more vigorous than Crimson Rambler, and the foliage of all the kinds I have grown is quite as sweet-scented as that of the old Sweetbrier. They appear to be perfectly hardy in this section, and a friend in Minnesota says they survived a temperature there of twenty-five degrees below zero. Occasional complaints were heard in England about their not flowering freely. In the south of Scotland I saw, toward the end of July, shoots of the current season's growth from six to nine feet in height, so there can be no question about their vigor. The

flowers are pleasing and cover quite a range of colors. The bright scarlet hips which follow the flowers are also highly ornamental. The more recent introductions of this class are specially fine. Lucy Bertram is a beautiful rich crimson with pure white centre; Jeannie Deans is crimson scarlet, semi-double, and flowers in clusters; Green Mantle, bright rich pink, with a band of white encircling the anthers, is also pretty; Catherine Seyton is a pleasing tint of rosy pink; Julie Mauvering is a lovely porcelain pink, and Minna a pure white of large size. All these are decided acquisitions and should become popular when procurable at a reasonable price.

Among the newer hybrid Tea Roses, Belle Siebrecht bids fair to become extremely popular. It was extensively planted for forcing during the past season by many of our leading Rose growers. It is too soon yet to have their opinion of its merits, but it is expected to rank high during the coming winter. Madame Abel Chatenay, sent out by Pernet-Ducher, is a new hybrid Tea of real merit. The flowers are full, the buds spiral in form, rosy carmine in color, shaded with vermilion-rose and tinged with salmon. Souvenir de President Carnot, also raised by Pernet-Ducher, is much after the style of the old Niphetos, with a stiff, erect habit. The buds are long, color of flower rosy flesh, shaded with white. Beauté Lyonnaise, from the same French hybridist, is a very large and full white Rose of stout, erect growth. The flower is slightly, but pleasingly, tinted with pale salmon. In Mr. Turner's nurseries these three Roses are being largely propagated, and are highly thought of, and they certainly seem likely to be better known in the near future. Mrs. W. C. Whitney, another comparatively new but well-known hybrid Tea, has also been generally planted this year. A few plants we have look very promising. The buds are long and of extra-large size; the flowers are of a beautiful cream-pink shade, and they hold their color well in winter. Those who handled it last winter speak highly of Mrs. Pierpont Morgan, and it has received certificates wherever shown. It is a sport from Madame Cusin, but is a much stronger grower than the parent and produces larger flowers, which are of an intense rose-pink shade, with a rich Tea fragrance. I recently saw a bench of this variety which showed remarkable vigor. It is said to be a profuse bloomer, even in the dullest winter months, and it ought to be a decided acquisition.

Marchioness of Londonderry gives promise of being a high-class hybrid Perpetual. It has made vigorous growth here during the past season and has not mildewed at all. It is a welcome addition to the white-flowering section. Clio, which is something after the style of the ever-popular Baroness Rothschild, also seems likely to be valuable. The flowers are flesh-color, shaded rosy pink toward the centre. Marchioness of Devonshire, satin-pink in color, is also good. Two of Dickson's new varieties, Helen Keller and Mavourneen, as seen last July, are very fine. The first-named is a beautiful rosy cerise color, while Mavourneen is a delicate, silvery flesh-white, shaded with rose. Both are said to be of vigorous habit. Mrs. R. G. Sharman Crawford has not made very good growth here. This Rose is of a rich rosy pink shade, the centre petals pale in color and white at the base. None of the newer introductions approach Mrs. John Laing in all-round excellence. It is a fine autumnal bloomer, and every shoot has a flower on it. Here it has given us many fine flowers during September. It is much to be regretted that so few Roses of the hybrid Perpetual class give us any flowers except for a couple of weeks in June.

Taunton, Mass. *W. N. Craig.*

Flower Garden Notes.

OWING to protracted rains, the outdoor garden is less attractive than we ever remember to have seen it at this season. Asters, Boltonias, Silphiums and Pyrethrum uliginosum, which ought to be making a superb display, are but a sorry spectacle, and the only really bright thing we have is the Scarlet Sage, Salvia splendens, and a few Zinnias. These were planted where the first frost could not touch them, and it is surprising how much influence neighboring trees can exercise in keeping off the earliest frosts that usually blight the tenderest plants.

It has not been safe in past years to lift plants or roots from a permanent border in the autumn months; there are so many things that are invisible above the soil at this season, that it is wise to defer thinning out until spring, when all are appearing above ground. If, however, it is desirable to add plants to make losses good, or, even to remodel altogether, it is always best to do as much as possible now before the soil loses its warmth and while it is well moistened down to a good depth.

As soon as all border plants have died off or turned yellow, so that they can be cut down, we shall add the annual top-dressing of well-decayed leaf-mold, putting it on to a depth of at least four inches all over the beds. This makes a good protective covering as well as a fertilizer, and brings in far fewer weeds than stable litter. At this season it is economy to save every leaf that can be gathered and heap them for future use; it takes two years for them to decay thoroughly, and a turning over once or twice a year will materially hasten the decomposition. If lime be not present in the natural soil of the locality, it will be well to add it to the heap as it is turned over; it will also help the process and add to the value of the whole as a fertilizer, but care must be taken not to use any of the compost for Ericaceous plants, such as Rhododendrons, Kalmias, Ericas, Andromedas or other allied plants, for lime is poison to the roots of all such. Many have found how difficult it is to cultivate these plants on a limestone formation. In this section no limestone is in the rock formation, so that an application of lime is a help to soils that are under cultivation for any length of time.

We have already lifted and replanted all the Narcissus-bulbs. This was the year to separate the clumps that had been growing larger than was good for the best results, and all have been replanted again. It is not too late to do this work now, but it is not safe to defer much longer, because the roots are in active growth soon after the fall rains set in. A light mulch over all when planted will keep out a lot of frost and induce a strong growth this fall, which will greatly improve the display next year, besides acting as a fertilizer for such annuals as are used in the borders.

Some recent exhibits of Salpiglossis before the Massachusetts Horticultural Society have enlightened many as to their value for summer-border use; there seems to be a great advance made lately with this beautiful annual. It is also a mistake to plant the seeds in the greenhouse, for the young plants do not like transplanting, and thrive well when sown where they are to bloom; the colors are very beautiful in the softness and delicate marking. The Salpiglossis is among the best of garden annuals for house decoration when the flowers are cut and used in vases, and they last well.

Any plants that are needed for propagating, if herbaceous, should be lifted soon and stored in boxes in cold frames until March, when they may be put into a warm greenhouse and cuttings made of the young shoots. Most herbaceous plants root freely in this way, and soon make strong plants to set out in spring. This is the best way to increase the finer forms of garden Phlox, Veronicas, Helianthus, Campanulas, Lychnis and the like.

Bulbs of tender plants must be taken up as soon as the tops are browned by frost; Gladioluses, Cannas and Montbretias may be laid out to dry for a few days before storing in the winter quarters. We put the Gladiolus corms in bags and suspend them in a cool cellar; Cannas seem to need a warmer place. A temperature never less than forty-five is best suited for them, or many will be lost from damp and decay.

South Lancaster, Mass. *E. O. Orpet.*

Some Little-known Plants.

COREOPSIS ROSEA, a pretty little native species, has been in flower in this garden for the past six weeks. It grows about a foot high, with branching stems and opposite linear leaves from one to two inches in length. The flowers are some half an inch in diameter and freely produced if it has a sunny position in the hardy-plant border. It is a perennial and easily propagated by seeds, flowering the first year if the seeds are sown early in the greenhouse and the young plants grown on.

Tylophora aristolochioides is a rapid-growing twining plant, with opposite oblanceolate leaves from four to six inches long by two wide. It is a native of Japan and belongs to the Milkweed family. It has not yet flowered in this garden, but if it proves hardy it will make a useful plant for climbing porches, etc. T. sublanceolata, var. obtusata, is a diminutive twining plant, growing only about two feet high, with small opposite leaves and cymes of small, brownish purple flowers. It is also a native of Japan. Both species do well in a sunny position, but of the two species T. aristolochioides is by far the better.

Hydrocotyle Asiatica is a low-growing umbelliferous plant, with leaves so like the common Violet that the plants are often mistaken for Violets. The flowers are inconspicuous, being very small, dull pink in color and almost sessile on the creeping stems. If it proves hardy, which is not probable, it may be used with good effect in some positions in the rock garden. H. moschata is a much more diminutive species, growing

only about three inches high, but it forms a perfect carpet of its pretty leaves, which are also reniform, but with lobed edges. It is a native of New Zealand, and of the two species I consider this one the better.

Calandrinia longiscapa is a Chilian species of this genus. It grows to a height of eighteen inches, with branching stems. The fleshy leaves are opposite, oblanceolate in outline, three inches long by one and a half wide. The small pink flowers are borne on rather long terminal panicles, and, like other members of the Purslane family to which it belongs, opening only in bright sunlight. After flowering it produces small, globular, scarlet seed-vessels, which are rather attractive.

Cucubalus baccifer is a trailing plant with stems a yard long oppositely branched at intervals of two inches, each branch

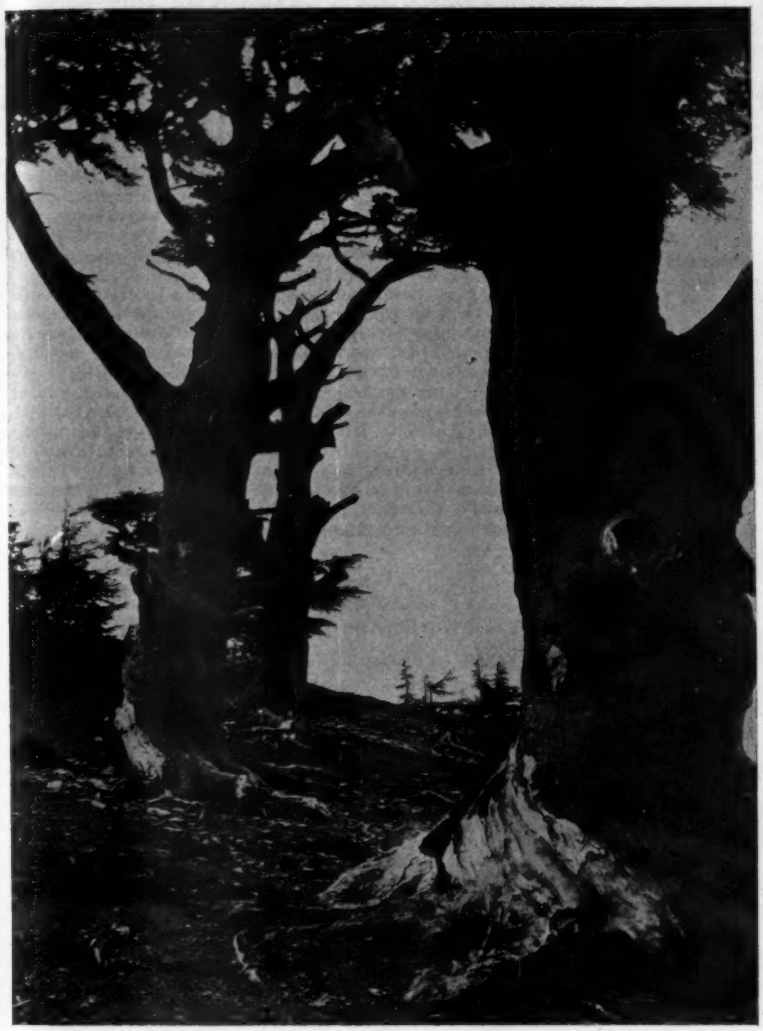

Fig. 55.—Cedrus Atlantica.—See page 412.

being about six inches long. The almost sessile leaves are opposite, lanceolate in outline and slightly hairy. The flowers are borne singly on short peduncles, with petals small and white, but a pretty cup-shaped, persistent calyx, which makes them attractive. It is a native of northern Asia and belongs to the Pink family.

Clitoria heterophylla, although a native of the tropics, does well planted out in a partially shaded position, and has been in flower for the past month in this garden. Like many of the Leguminosæ to which it belongs, it is of low, straggling habit. The leaves are all pinnate, alternately disposed on the stems. The leaflets are small, and, as the specific name indicates, of two forms, some being round, while the others are best described as panduriform. The flowers are of a beautiful azure-blue color inside, and white outside. The shape of the flower differs from the Pea in having the petal called the standard below instead of above. It is easily propagated by seeds.

Coronilla scorpioides is a low, straggling annual with stems a foot and a half long. The almost sessile trifoliate leaves are alternately disposed on the stems. The leaflets are ovate, the terminal ones larger than the side leaflets, being one inch long by three-quarters wide. They are glaucous and of a bluish green color. The small yellow flowers are borne on short peduncles in the axils of the leaves. They closely resemble the flowers of Scorpiurus, and the fruit has a tendency to mimicry of some insect, as Scorpiurus does. It is a native of Persia, and is easily raised from seeds sown in the open border.

Basella rubra is a trailing plant belonging to the Goosefoot family. The leaves are somewhat fleshy, oblanceolate in outline, three inches long by two wide. The flowers do not apparently open, but the little pink buds, which are disposed on small spikes, sessile in the axils of the leaves, are very pretty. Though it does well in an open position in the hardy plan-border, it is a very pretty subject for a hanging basket in a warm greenhouse. It st a native of India, where it is known as Malabar Nightshade. It is readily propagated either by seeds or cuttings.

Stachytarpheta Indica is a shrubby annual belonging to the Vervain family, and grows about two feet in height. The oblong lanceolate leaves are three inches long by one and a half wide with coarsely serrated edges; they are blotched with a peculiar bluish green color, which gives the plant a somewhat distinct appearance. The small, deep blue flowers are on spikes about six inches long, and continue nearly all summer. It is a native of the West Indies. S. mutabilis is a much coarser-growing species, with large opposite leaves four to six inches long by three wide. The flowers are borne on terminal spikes; they are also small, but of a rosy pink color. The plants do not flower till October, and if grown in the open border they must be lifted and placed in a warm greenhouse to flower; at least, this is our experience with the plant. It is a native of South America, and Nicholson's *Dictionary of Gardening* says "the leaves have been imported into England for adulterating tea-leaves." It is synonymous with Verbena mutabilis.

Edward J. Canning.
Botanic Garden, Northampton, Mass.

Asplenium ebeneum.

THIS is one of our most attractive Ferns at this season when the foliage about it drops away and the dainty fronds which have been half-hidden through the summer are again unveiled. We sometimes find them by the roadside in a tangle of Brier or other wayside shrubbery, but always on high ground, in light soil, in proximity of rocks and stones. There is no mistaking this Fern for any other species or variety, for botanical limitations of dimension are closely followed. The fronds are from nine to eighteen inches high and rarely exceed or reach the width of an inch. The stripe is black and glossy and the fertile fronds very erect.

If the arrangement of the auricled pinnæ seems too precise, this defect is countervailed by the graceful spread of the curving sterile fronds around the base of the plant. For indoor culture through the winter this Fern is excellent, whether grown in pots, boxes or under glass. It especially delights in birch-bark baskets, and is much more attractive when thus arranged; but, in any case, the roots should be placed against small stones and native soil supplied if possible. Plants for cultivation must be intelligently selected, for if the indusia have discharged their spores, decay of the fronds is but a natural sequence; if, on the other hand, the indusium is intact, such fronds may be relied upon to hold their own until new fronds appear in early spring. But if all the fronds are broken off, after a little rest entire new growth will appear, which, if lack-

ing in the stamina given by open-air exposure, far exceeds such growth in grace and delicacy. Overwatering is disastrous, and it must always be borne in mind that in the cultivation of Ferns but little water is needed, except in the case of Bog Ferns.

Under glass, Asplenium ebeneum is counted among standard Ferns; so secure is it of this position that it indulges in all manner of freaks. A branching rachis is not uncommon, and fronds appear with the pinnæ of A. Trichomanes promiscuously intermingled with its own. The collector must be cautious if he would preserve his specimens unbroken, for brittleness is a marked characteristic of A. ebeneum, especially of the fertile fronds.

Pittsford Mills, Vt. *G. A. Woolson.*

Correspondence.

Fertilizers for Orchards.

To the Editor of Garden and Forest:

Sir,—Will you state in your journal what is the best fertilizer for Apple-trees. I have no adequate supply of stable-manure, and must buy chemicals.

Bloomfield, N. J. *A. R. B.*

[No categorical answer can be given to questions of this sort unless one has definite information about this particular orchard upon such points as the character and condition of the soil, whether the trees are young or old, vigorous or feeble. Every fruit grower, and, indeed, every farmer who uses commercial fertilizers, ought to know something of the general principles which underlie the use of these substances. It should be understood that Apple and other orchard fruit trees need certain mineral elements, and since they grow slowly they can be treated with such substances as leather waste, horn refuse, tobacco-stems and other slowly decomposing manures; but, of course, in the application of such manure, and, indeed, of any manure, some definite system must be followed. No better fertilizer for fruit-trees can be used, as a rule, than one part of muriate of potash and one and a half parts of ground bone. Wood-ashes or cotton-hull ashes may be used in place of the muriate to furnish potash if they can be cheaply obtained. Manures which are highly soluble will be probably washed out of the soil before they are all utilized by the tree, and, therefore, large applications of nitrate of soda are not to be used. It should be remembered, however, that the soil should be in good mechanical condition—that is, not too open nor too compact, not too wet nor too dry—if any fertilizer is to have its best effect. Above all, never apply any fertilizer whatever until you have looked at the whole subject with sufficient care to enable you to devise some intelligent system which can be persisted in. In Farmers' Bulletin No. 44, issued not long since by the Department of Agriculture, Professor Voorhees states clearly and succinctly some of the foundation truths in regard to fertilizers which every cultivator ought to know. One who carefully follows the directions here laid down is not likely to commit any serious error.—Ed.]

Two Rare Ferns—Asplenium Bradleyi and Trichomanes radicans.

To the Editor of Garden and Forest:

Sir,—I went, early in July, to the place where Professors Shaler, Procter and Hussey camped for three months while making the survey of Edmonson County, Kentucky, in 1875. I wanted to note any changes in the flora since Professor Hussey's report was made, and I found many. The forests, when he wrote, were much older than the so-called "barrens" of the neighboring counties, especially of Barren County, as once they had escaped the forest-fires kindled elsewhere by the Indians. In the deep gulches cut by Nolin and Bear Creeks, the extremes of heat and cold are greatly modified, and protection is furnished to many species of plants not found elsewhere. Most of the larger trees are now being rapidly cut for cross-ties, and the ridges following Green River and its tributary streams have been denuded of their many large Chestnut Oaks, Chestnuts, Tulip and White Walnut trees, and still the work goes on. This, of course, has affected the undergrowth. Along the wooded road on top the sandstone ridge I find only a few plants where I expected many, and under the cliffs the change is noticeable.

It is in this part of Edmonson County, on both sides of Nolin River, that the new, or rather the European, Mullein, Verbascum phlomoides (found, so far as known, nowhere else in the United States) made its appearance two years ago. It is being rapidly exterminated by the officers of the experiment station. One noble rock—Dismal Rock—is over three hundred feet high, a grand perpendicular wall with a seam or crevice not over three feet wide at the top and less than six inches at the base, open as clean as if cut with a knife. Its base is covered with the Umbrella Tree, Kalmia and a few large Hemlocks and Jersey Pine. On the face of the rock were fine plants of Asplenium montanum and a few A. pinnatifidum.

The point of interest to me was the place where Professor Hussey for the first time in this state found Asplenium Bradleyi. I found it in Warren County in 1892. It was still growing there, under a high projecting rock at the head of one of the small streams. I counted more than fifty plants, though I could not bring myself to gather more than two or three roots, and, perhaps, a hundred fronds. Many of the plants are dead, and I think the days of the others are numbered.

The forests near have been so cleared out, the land up to the ravine on either side is now in cultivation, and it seems only a question of time when many of the Ferns here will disappear. This rare Fern is scattered over the face of the high cliff, from base to summit. Its only companions were Asplenium Trichomanes, in numbers, and A. pinnatifidum. I gathered the last mentioned and A. Bradleyi from the same crevice, their roots interlocked.

I found a fine lot of Trichomanes radicans in Warren County this summer, growing under a sandstone cliff in constant moisture, and also found it in Edmonson County in three different places. There were but few plants growing at these latter places, however, and I presume these, too, will soon disappear. The loss of shade about its favorite haunts will, no doubt, prove fatal. It is a beautiful object, growing under a cliff, often in darkness, with the moisture trickling through the rocks, each point of leaflet and bristle bearing a tiny drop of water, like a miniature yellow diamond. The Ferns in company were Asplenium Trichomanes, a Moss (not yet determined), while above it grew Dryopteris marginalis and an occasional Asplenium pinnatifidum.

Bowling Green, Ky. *Sadie F. Price.*

The Forest.

The Burma Teak Forests.—XI.

VALUE OF PROFESSIONALLY TRAINED OFFICERS.

THE idea of using the flowering of the Bamboo in order to form Teak plantations I had long entertained, but the credit of having started this work upon a large scale belongs to Mr. Berthold Ribbentrop, the present Inspector-General of forests in India. In speaking of military officers I have purposely dwelt upon the excellent work done under good guidance by men who had not had the advantage of a special professional training. This was in the early days of forest administration in India, when the work was of a more simple nature and when professional questions had not attained prominence. After I had completed seven years' work in Burma and had during three years more endeavored to promote the development of the work in other provinces, I came to the conclusion that further progress was not possible without the introduction of men with a thorough professional training. I will not detain the readers of Garden and Forest by an account of the manner in which I succeeded in overcoming the objections which at that time were raised nearly on all sides against this measure. As stated in a late article in this paper, I obtained permission to organize a system of professional training of a number of young Englishmen to be sent out annually—some to be trained in France, others in Germany—and I succeeded in securing the services of two young forest officers from Germany, Dr. Schlich, the author of the excellent *Manual of Forestry* repeatedly noticed in the pages of Garden and Forest, who succeeded me as Inspector-General of Forests in 1883, and who is now at the head of the Coopers Hill Forest School, and Mr. Ribbentrop, who had worked under Forest Director Burckhardt at Hanover, one of the most eminent foresters of the present century. Working in the spirit of his great teacher, Mr. Ribbentrop, succeeded in devising cultural operations intended to increase the proportion of Teak in the forest in a variety of ways, among others by dibbling in Teak-seed in places where the Bamboo had flowered. These operations have been steadily continued, and now form some of the

measures regularly adopted in order to improve the productiveness of the Burma Teak forests.

FUTURE YIELD OF TEAK PLANTATIONS.

In 1894 the following areas had been stocked with Teak on plantations and by means of cultural operations. Under toungya plantations the figures here given include a certain area (2,701 acres) on which Teak was planted, mixed with Cutch (Acacia catechu). The areas planted with Cutch pure (366 acres) have been omitted, since the present communication is intended chiefly to give an account of the Teak forests :

Regular plantations, ...	3,996 acres.
Toungya plantations, ...	31,287 "
Cultural operations, ...	3,723 "
	39,006 "

The annual yield of these areas will eventually constitute an important addition to the yield of the natural forests. What has been stated will have made it clear that these areas, when mature, will not be stocked with pure Teak. Bamboos and other trees will spring up and will form an important constituent of the mature forest. But even where Teak may predominate in the growing stock, as will be the case in regular plantations established in places easy of access, where cleanings could be more regularly attended to, they will occupy narrow belts, mostly surrounded by other forest. As these plantations advance to maturity it may with certainty be expected that while the Teak will spread from self-sown seed into the neighboring forest, other kinds, especially such as stand shade, will spring up among the Teak-trees. Nor is it desirable that these plantations should grow up as pure Teak woods, for, as a rule, the Teak does not attain perfection in pure woods. In the above figures, however, all areas which contain less than forty per cent. of Teak have been excluded.

It will be remembered that the most recent researches regarding Teak grown on the hills of Pegu under the régime of annual jungle fires, have established the age of a tree six feet in girth to be between 134 and 156 years. In plantations, however, from which fires are kept out, the growth is quite different, it is much more rapid, and we are justified in the assumption that the present plantations will, at the age of ninety years, carry, in addition to Bamboos and other trees, sixty mature Teak-trees per acre, each tree yielding seventy-five cubic feet of timber. Thus, if thinnings are excluded from the calculation, the mean annual yield of successful plantations, continuously protected against fire, may be estimated at fifty cubic feet per acre. As already stated, on a limited area Teak and Cutch have been planted together, and otherwise it may be doubted, whether the whole area will come up to this standard, but even if we only estimate an average yield of thirty cubic feet per acre, the 39,000 acres artificially stocked with Teak up to June, 1894, will furnish 23,400 tons a year, or more than one-third of the Teak timber extracted annually during the five years ending with June, 1894. And these plantations and cultural operations are being extended steadily. In 1893-4, 4,134 acres were planted, which, when mature, at thirty cubic feet per acre, may be relied upon for an annual yield of 2,400 tons. It has in a previous portion of this paper been explained, that while during the last five years in the natural forests 20,300 trees a year were girdled on an average, the Teak timber extracted annually during the same period amounted to 68,000 tons ; further, that after special working plans shall have been prepared for all forest districts, it is expected that 40,000 trees a year will be girdled. Thus, eventually the natural forests alone may in their present condition be expected to furnish twice the present annual timber outturn. And to this will, in course of time, be added the yield from plantations which, if operations are continued as at present, will soon equal the yield of the natural forests.

THE FUTURE YIELD OF THE FORESTS WILL BE INCREASED BY PROTECTION AGAINST FIRE.

But apart from plantations and cultural operations, the natural forests are capable of great improvement. It has been stated that the area protected from fire in the reserved forests of the British Indian Empire amounts to one-third of the whole. In Burma the work of fire protection is much more difficult than in other provinces, and of the 6,374 square miles of reserved forests in lower Burma it has not yet been possible to protect from fire more than 8½ per cent. The protected area is increasing steadily, but slowly. As it increases the soil improves, less seedlings are destroyed and a smaller number of large trees are damaged by the fires. True, Bamboos and other trees profit equally, but with the special care bestowed upon the Teak, that tree profits more and the result eventually will be a larger annual yield of Teak timber from the same area. On several occasions in these pages the Karens have been mentioned as the most important inhabitants of the forests of lower Burma. Their villages teem with children, and under the strong and just British Government their numbers increase steadily. When the reserved forests were demarcated, certain areas were assigned to them in each forest district, sufficient to furnish forest for their shifting system of toungya cultivation, and calculated liberally, so as to provide for an increasing population. Many of these Karens are employed in planting Teak on their toungyas, and thus they contribute materially to augment the future yield of the forests. The present yield of the natural forests under the special working plans made within the last twelve years amounts to seventeen tons girdled annually upon a thousand acres, or to less than two cubic feet per acre. As fire protection is extended, as larger areas are planted, this insignificant yield per acre will eventually be a thing of the past.

Bonn, Germany. *Dietrich Brandis.*

Exhibitions.

Flowers and Fruits at the American Institute Fair.

UNDER the direction of the Farmers' Club there is now in progress an exhibition of fruit and vegetables and flowers in connection with the American Institute Fair at Madison Square Garden, in this city. During last week the leading flowers shown were Dahlias, and a large collection of the best varieties was contributed by such experts as Mr. W. P. Peacock, of Atco, New Jersey, who showed more than 2,500 blooms, which in the main were in admirable condition, and deservedly took the first prize. In almost all the classes for these flowers the Rev. C. W. Bolton, of Pelhamville, New York, a well-known amateur, was second, and the Horticultural Department of Cornell University showed 212 varieties which were particularly interesting botanically. The leaves showed a wide variety in form and color, some of them being cut almost as fine as a Fern-frond, and others showed tints of bronze and maroon. Dahlias have always been flowers of pure color, but until the single varieties and the so-called Cactus forms were introduced there was an artificial and rigid look about them which was not winning. The time seems to have come when we may expect great changes in the character and habit of both plants and flowers. Many of the latter now show petals singularly rolled or arranged loosely after the fashion of Japanese Chrysanthemums, and they are more gracefully borne on long stems. The variety Clifford W. Benton, for example, a yellow flower of full Cactus form on tall arching stems, seemed as unconventional as Chrysanthemums of the best type, and some of the pink ones show a clearness and purity of tone which no Chrysanthemum of this color has yet attained.

In spite of the lateness of the season a large collection of unusually good Gladiolus was exhibited by John Lewis Childs, Floral Park, besides something like a hundred varieties or more of hardy flowers. A bank of decorative plants on the stage contained many fine specimens sent by Messrs. Siebrecht & Wadley and Richard Brett (gardener to J. B. Colgate). An unusually comprehensive display of vegetables was shown, one collection of tomatoes containing eighty different varieties. Grapes made the leading feature of the fruit display, and, except a few of the very early sorts, nearly every variety in cultivation here was shown. Mr. C. C. Corby, of Montclair, took the first prize, and Ellwanger & Barry the second, in this creditable display. Mr. D. M. Dunning, of Auburn, showed some magnificent clusters of European grapes, and Mr. William Parry astonished visitors with twenty distinct varieties of chestnuts grown on his place, including all the improved forms. Many of these were in the burs, which were of enormous size and showed wide diversities of form, weight, color and flavor. Mr. Parry's collection also included walnuts, native and foreign, filberts and many other nuts.

This week the space will be largely devoted to apples, but the labeling and staging are not yet completed as we go to press. There is little doubt, however, that in size and quality the display of apples will excel anything of the kind hitherto seen in this city.

Notes.

The leaves of Tricyrtis hirta seem to be disfigured less than usual this year, and whenever they escape this rusty look the plant is altogether desirable. The curious purple-spotted flowers, with their six-leaved perianth and conspicuous three-cleft style spotted in the same way, are interesting and truly beau-

tiful when closely examined, although they make little show at a distance. This Tricyrtis, or Toad Lily, as it is sometimes called, is perfectly hardy, and it likes rich soil and partial shade.

Mrs. Wilhelmina Seliger writes in the *Hartford Times* that if the berries of the Mountain Ash are dried they will keep well all winter and make a very good variation in the diet of pigeons and domestic fowls of all sorts. Poultry are very fond of them.

Frosts are shortening near-by supplies of the more tender vegetables, and peas and string-beans are already coming from Virginia and South Carolina to supplement northern crops. Field mushrooms from western Pennsylvania sold on Monday for fifty cents a pound, and the cultivated product, of more compact substance, for $1.15.

Campbell's Early Grape receives nothing but commendation, so far as we know, from all who have tried it in widely different parts of the country. Its good qualities seem to be hardiness of vine, healthiness of leaf, large bunches and good-sized individual berries with a thin but very tenacious skin, which helps them to endure transportation well.

Professor Halsted writes, in relation to the Asparagus rust of which we spoke on page 394, that from the replies elicited by his circular this disease is probably confined to a few localities, although future reports may show that it is doing damage on a wider scale. It is worth while for observers to make a careful examination of Asparagus beds in every section of country to see whether or not they are infested. In any case, it is important to burn over every infected field before this destructive disease is more widely disseminated.

The last number of *The Southern Farmer* publishes an illustration of a dewberry which is called Austin's Improved. It is certainly of the largest size, and is said to be not only very prolific, but of the most tempting flavor. The berries seem three times as large as a specimen of the Early Harvest blackberry, which is photographed on the same plate, and it may readily be believed that the blackberry is of the average size, if the statement is correct that fifty-three of these berries quite filled a quart box. The berries were grown at Pilot Point, Texas, by J. W. Austin, and we should like to have them tried in a more northern latitude.

Mr. Charles H. Shinn writes to *The Independent* that a large beet-sugar factory has just been established at Salinas, California, and some thirty thousand acres of land there will be devoted to this crop. There are three other factories in the state, two of them very large, and the land devoted to beets in thirty or forty acre tracts last year is said to have yielded farmers about $40 an acre profit. There are large areas of land in California which have been mapped out by the agricultural department of the university of that state as profitable for beet culture, and the advantages offered for this industry in California are principally a long working season and a high sugar percentage in the roots. Fuel, however, is not cheap, and water is not always abundant. If California is to produce enough beet sugar to supply the present demand of the United States, it will require 1,840,000 acres of land to furnish beets for 460 factories, each with a working capacity of 350 tons of roots a day for the season, and, directly and indirectly, employment would be given to half a million persons.

As illustrating changes of vegetation, Mr. Hemsley, in *Knowledge*, refers to the rugged island of St. Helena, with its area of 38,000 acres, rising 3,000 feet above the Atlantic, at a distance of 1,000 miles from Africa and nearly 2,000 from the nearest point of the American continent. When discovered it was entirely clothed with forests, but the hogs and goats which were left on the island to provide food for chance visitors multiplied to such an extent that they destroyed the vegetation, or, at least, prevented the seedlings from growing. The island was not botanized until the beginning of the present century, when some of the native plants had probably disappeared already, and in 1875 an account of the flora showed that less than half a dozen of the sixty-five known species of indigenous flowering plants and Ferns collected at the beginning of the century were actually extinct, but, with the exception of a few scattered individuals, the remains of the original flora were high up on the central and inaccessible mountain ridges of the island. Of trees which once covered hundreds of acres only a few individuals, and in some cases only a single example, remained. Large areas once covered with vegetation were bare, since the rains had washed the soil from the rocks. Other parts had been completely possessed by introduced plants from various parts of the world, among them many British species, the common Furze being the most abundant shrub. Among the trees the British Oak was the most thoroughly naturalized, growing to a great size and producing acorns in profusion, and the Scotch Fir and other conifers had been planted to the extent of two hundred acres, so that the whole surface of the island has been completely altered, and many of the original plants will soon be extinct because they succeed nowhere else in a wild state, and in cultivation they are difficult to preserve.

Not even excepting apples, no fruit is at present seen in our markets in so large variety as grapes. Five-pound baskets of large-berried Concords cost but fifteen cents, while twenty cents is the price for the same quantity of Delawares and Catawbas, and Niagaras command twenty-five cents. Of thirty-six car-loads of California fruit sold here during last week the greater part was Muscat, Black Morocco, Black Prince, Cornichon and Flame Tokay grapes; these sell for from sixty to seventy-five cents a basket. Almeria grapes, the first of the season having been offered last week, cost twenty cents a pound. Gros Colman and Muscat grapes, grown in hot-houses in this country, sell for $1.25, and the handsomer fruit of the same varieties, from England, for $1.75 a pound. Selected Jamaica oranges retail for thirty to sixty cents a dozen, medium-sized grape-fruit for $1.00, and handsome smooth-skinned limes, as large as a medium-sized lemon, are seen in the best fruit-stores, for twenty-five cents a dozen, ordinary small ones costing ten cents. A few large shaddocks recently came from the West Indies, but there is little demand for this pink-fleshed fruit, which, though juicy, is lacking in flavor. Tangerines, from the same islands, cost seventy-five cents a dozen. The last Bartlett pears, firm and well-colored, bring fifty cents to $1.00 a dozen, and Comice pears from seventy-five cents to $1.50 a dozen, according to size and quality. Baskets of Maryland peaches holding thirty fruits may yet be had for $1.00, the same price asked for somewhat smaller baskets of Salway peaches from California. Extra-large specimens of this western fruit find buyers at seventy-five cents and $1.00 a dozen. Spanish melons cost twenty-five to forty cents each; persimmons, from Florida, fifty cents to $1.00 a dozen; prickly pears, from Italy, fifty cents a dozen. The Chinese Lychee nuts cost twenty-five cents a pound. Plump, fair-sized chestnuts from New Jersey, bright and of rich color, sell for twenty-five cents a pound, and very large cultivated nuts from the same state for fifty cents a quart.

A correspondent of *The Country Gentleman* explains how any one who lives in a village or city where a sunny space three feet square is available can have fresh strawberries of first-rate quality in their season. The outside of a strongly bound barrel is marked into four-inch squares, an inch hole is bored in the centre of every alternate square corresponding to the black squares in a checkerboard. Well-enriched garden soil is placed in the barrel to the level of the first row of holes, and then Strawberry plants are inserted through the holes, with the roots rather higher than the stems to allow for settling, when more soil is put in and firmly packed. This layer is then sprinkled with water and the process is continued until the barrel is filled with soil and a plant is set in each hole. An ordinary linseed oil barrel will contain about 135 plants. The barrel should be set on a box, or something to lift it above the ground, so that the foliage can be sprinkled occasionally and insects kept from the berries. The barrel is covered to prevent the escape of moisture, and in watering the plants a few holes are made through the soil with a stick and water or liquid-manure is poured in as the plants need it. They can be set in spring, or if this is done as late as August a fair crop will be borne the next year, and this will be repeated four or five years without renewal. Three or four bushels to a barrel is an average crop of berries, and five bushels is the maximum, although the yield depends on the variety and management. In winter in localities where there is a low temperature a light covering of straw should be thrown over the barrel. Sharpless and Crescent—that is, a combination of pistillate and bisexual plants—do well, and so do Bubach and Marshall, and other varieties will undoubtedly flourish. The berries will do fairly well in partial shade, although, of course, a sunny place is preferable. Since no runners will grow, the strength of the plant goes more directly to the fruit, and clean berries are secured without any trouble of cultivation or weeding. The Strawberry barrel is highly ornamental at any season, and particularly so when the plants are in bloom and in fruit. We have never seen this tried, although we have often heard of it and should like to have the result of some one's experience. It is said that some nurserymen have been selling barrels furnished with plants for six or eight years, and more than one thousand of them have been sold in New York state, many of them in Brooklyn.